Balloon Federation of America

An Air Sport Organization of the NAA

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2608/6

FAA-2003-16590-1

Federal Aviation Administration
Office of the Chief Council
Attention: Rules Docket (AGC – 10)
800 Independence Avenue SW
Washington, DC 20591

DKT 30166

OFFICE OF THE CHIEF COUNSEL RULES DOCKET
2000 AUG -1 P 2:

AFS-00

SUBJECT: PETITION FOR GRANT OF EXEMPTION

Pursuant to Section 11.25 of the Federal Aviation Regulation (FAR), the Balloon Federation of America (BFA) hereby petitions the Federal Aviation Administration (FAA) for exemption from FAR Sections 91.119 (b) and (c) to the extent necessary to permit the BFA to conduct a sponsoring study of the increase in safety to persons and property on the ground by allowing balloon pilots to fly at lower altitudes. (See Appendix A, BFA Safety Study.) The BFA is a 501(c)3 educational organization with 4,000 members founded in 1967 for the purpose of enhancing safety and promoting the sport of ballooning.

Under this study, balloons would be permitted to fly at an altitude sufficient to ensure the safe operation of the aircraft with respect to persons, vessels, vehicles or structures on the surface, rather than being restricted to an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet in congested areas, and 500 feet over other than congested areas.

The BFA believes such an exemption would greatly enhance the safety of balloon flight from the standpoint of persons and property on the ground, and expects to prove such in the proposed study.

NATURE AND EXTENT OF RELIEF

Implementation of the BFA study will require exemptions to the following sections of the FARs: 91.119(b) and 91.119(c)

FAR 91.119(b) states, in pertinent part, "Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (b) Over congested areas. Over any congested area of a city, town or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

The relief requested is from this entire subsection.

FAR 91.119(c) states, in pertinent part, "Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle or structure.

The relief requested is from this entire subsection.

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OFFICE OF THE CHIEF COUNSEL RULEMAKING

AFS-00-696-E

AIRCRAFT AND PERSONS COVERED BY THE EXEMPTION

1. U.S. registered aircraft and foreign registered aircraft operated by U.S. certificated pilots
The following aircraft are proposed to be covered by the exemption:

a. U.S. registered lighter than air free balloons with airborne heater

b. U.S. registered lighter than air free balloons without airborne heater

c. Foreign registered lighter than air free balloons with or without airborne heater, provided they carry an airworthiness certificate from the country of registration, and are operated by a pilot covered by Paragraph 2 below.

2. BFA member pilots
In order to monitor and control the study, only BFA member pilots will participate. This will allow tracking of the pilots in the study, and will ensure that participating pilots receive the continuous flow of educational and safety publications produced on a monthly basis by the BFA. In addition, BFA pilots receive the most complete listing of balloon safety seminar information in the country. The BFA will keep its pilots informed of the ongoing results of the study through monthly updates in BFA publications, and more immediate updates on the BFA web site, www.bfa.net.

Pilots covered by the Exemption must:

a. carry a Private or Commercial airman's certificate, with a rating for lighter-than air free balloons.

b. be a current member in good standing of the Balloon Federation of America.

PUBLIC INTEREST

1. Safety to persons or property on the surface
Granting of this petition for exemption to permit balloons to fly at any altitude sufficient to provide adequate clearance from persons and property on the surface is in the public interest for reasons of safety.

Unlike any other aircraft, balloons are aerostatic—pilots have only one method of horizontal directional control at their disposal—changing their altitude. As the table below clearly shows, wind direction on any given day normally changes even in increments of 100 feet or less. (For a more complete explanation of balloon flight characteristics, see Appendix B, How Balloons Fly.)

A recent study undertaken by meteoroligist Dr. Richard Clark, a professor at Millersville University, provides irrefutable proof that the majority of changes in wind direction occur with decreasing altitude. Most of these directional variations are found at altitudes below 1,000 feet, the majority below 500 feet.

Allowing balloon pilots to make use of these changes as they plan their flights and landings will enable pilots to enhance the safety of balloon flight to persons and property on the surface, and to passengers, by making full use of all levels of altitude, rather than just those above 500 or 1000 feet as the regulation now reads.

Additional operable altitudes provide additional opportunities to change or adjust horizontal direction. Therefor, a pilot has significantly increased opportunity to respond to changes in terrain and to maneuver away from persons or obstacles, thereby providing a safer landing.

Each year, more than 300 balloon events are conducted under an FAA waiver, which provides, in part, relief from the minimum altitude restrictions required by the above two subsections. A review of the accident investigation summaries posted by the NTSB since 1983 shows that the granting of this waiver has had no adverse effect on the accident statistics during balloon events. Since waivered events provide the only legal opportunity for balloon pilots to operate outside these restrictions, such data is highly instructive. The BFA Study aims to provide similar data pertaining to balloon operations outside the confines of balloon events; in other words; balloon flights conducted under standard, daily, non-event operating conditions.

2. Safety to passengers
In the event of a burner failure, the ability to fly at a lower altitude enables the pilot to perform an emergency landing with much more control as to its location, greatly enhancing the safety to pilot and passengers. Such landings performed from high altitude have a far lower level of control.

EQUIVALENT LEVEL OF SAFETY

The BFA's proposed study and requested exemptions will not merely provide an equivalent level of safety to perations under this present regulation, but will in fact, ***enhance*** safety. Operations under the exemption requested herein should enhance total air safety due to the enhanced level of maneuverability resulting from the exemption.

In a number of documented cases, lives could have been saved, injuries avoided and property left undamaged had balloon pilots been permitted to fly at lower altitudes and maneuver more accurately to a safe and appropriate landing site.

In summary, the BFA believes that our proposed study will prove that unrestricted altitudes will address this critical need for improved maneuverability, and result in increased safety for persons and property on the surface, as well as for passengers.

SUMMARY

As required by FAR Section 11.25(d), a summary of the petition is as follows:

The Balloon Federation of America (BFA) petitions the Federal Aviation Administration for relief from the provisions of 14 CFR 91.119 (b) and (c) (minimum altitude requirements), to conduct a safety study. The requested relief will allow BFA member pilots to operate and maneuver at altitudes lower than those provided for in the rule. This relief from altitude restriction will improve the safety of balloon operations by increasing the maneuverability of the aircraft to the maximum extent permitted by prevailing weather conditions. It will also reduce the severity of accidents and incidents resulting from equipment failure by allowing pilots to land their aircraft as soon as safely possible.

Sincerely,

Charles Sundquist

Charles Sundquist

President, Balloon Federation of America

APPENDIX A—BFA SAFETY STUDY

The BFA proposes a three-year study to evaluate the safety enhancements provided by an exemption from FAR 91.119(b) and FAR 91.119(c). We believe such a study will provide informative and useful data in an effort to re-assess the regulation as it applies to lighter-than-air flight.

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a. U.S. registered lighter than air free balloons with airborne heater

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Pilots covered by the Exemption must:

a. carry a Private or Commercial airman's certificate, with a rating for lighter-than air free balloons.

b. be a current member in good standing of the Balloon Federation of America.

CURRENT WAIVER STRUCTURE FOR EVENTS

Under the current regulatory structure, balloon event organizers and officials apply for waivers so that their pilots may be freed from the requirements of 91.119(b) and 91.119(c). These waivers are granted as a matter of course, more than 300 of them per year. Pilots participating in such events agree to abide by the waiver, which includes wording to make sure they don't fly so close to the ground as to endanger people or property on the surface.

A review of incidents and accidents* involving lighter-than-air free balloons operating within the standard regulatory structure, and within waivered events, shows virtually no difference in the proportion of incidents and accidents per flight operation between waivered and non-waivered events and operations. There is a slight increase in safety in waivered events, but the difference is not statistically significant.

* Taken from the NTSB Accident Synopses web site: www.ntsb.gov/aviation/months.htm

It is important to remember that waivers are issued primarily for balloon competition or airshow-type events. Non-waivered flight operations take place with far less congestion of aircraft, and enable the pilot to make even better use of an altitude exemption for maximizing flight safety in maneuvering the aircraft.

One BFA pilot, operating in Texas, obtained an individual waiver releasing him from the altitude restrictions of FAR 91.119 for the purpose of advertising. The pilot operated under the waiver for a period of two years, without incident.

Enabling pilots to assess and use everything at their disposal, especially the forces of nature which govern their direction of flight, enables those pilots to best ensure the safety of persons or property on the surface.

COLLECTION OF DATA

The BFA will appoint a suitable party to collect and report data during the course of the study. This will include:

- voluntary feedback from participating pilots
- accident information from participating and non-participating pilots
- comments from FAA FSDOs (through a liaison designated by the FAA).

EVALUATION

At the conclusion of the study, the BFA will be available to participate with the FAA in the evaluation of its results, with the goal of providing the safest possible regulatory environment for balloons.

Appendix B—How Balloons Fly

Horizontal movement, or "steerage" in ballooning is a matter of finding air currents approximating the desired direction of flight.

Unlike other forms of aircraft, lighter than air free balloons have no direct horizontal directional control. The only means by which a pilot may change the direction of his aircraft is to change its vertical position in the air (altitude) by means of changing the relative buoyancy of the aircraft. This is done by adjusting the pressure within the balloon's envelope, either by changing its temperature (hot air balloon) or releasing ballast or gas (gas balloon).

Balloon pilots learn to be ultra-sensitive to even 1- or 5-degree changes in wind direction, and to employ these changes as necessary for safe flight. Figure 1 below illustrates a typical wind speed and direction profile, both forecast and actual, during a balloon flight.

Launch, Flight and Recovery:

Hgt FT	Dir DEG	Spd KTS
290	010	11
400	006	11
520	007	10
630	005	9
750	359	8
860	356	8
980	356	7
1090	355	8
1210	354	8
1320	356	8
1440	349	8
1550	351	9
1670	351	8
1780	354	9
1900	347	8
2010	346	9

0415L

Hgt FT	Dir DEG	Spd KTS
290	006	13
400	002	12
520	007	11
630	004	9
750	359	9
860	356	9
980	355	9
1090	357	9
1210	354	8
1320	356	8
1440	356	8
1550	359	9
1670	000	10
1780	358	9
1900	359	10
2010	352	9

0500L

At left, actual readings taken from an observation balloon approximately 2 hours before launch (at 0500 local time and 0415 local for Rantoul, Illinois).

Below, forecast wind data for the same location, during the flight period of 1200 to 1500 UTC.

215 08/11/99 1200

alt (ft)	mb	t/td (°C)	w_dir/w_spd (kts)
669	990	19.7/17.80	343°/004
738	988	19.9/17.70	345°/005
879	983	19.8/17.60	346°/006
1093	975	19.8/17.40	351°/008
1378	966	19.7/17.20	356°/009
1814	951	19.7/16.80	358°/010
2254	936	19.5/16.30	358°/009
2592	925	19.2/15.70	355°/009
2700	922	19.1/15.50	354°/009
3156	907	18.4/14.50	349°/009
3615	892	17.8/13.20	342°/010
4081	877	17.0/11.60	335°/011
4554	863	16.3/9.700	327°/012
4970	850	15.7/7.600	319°/013
5033	848	15.6/7.300	318°/013
5518	833	14.9/4.600	312°/014
6010	819	14.3/1.700	311°/014
6512	804	13.8/-1.10	314°/015
7021	789	13.5/-4.00	320°/016
7539	775	13.4/-6.80	324°/017
8068	760	13.2/-9.40	328°/018
8602	745	12.9/-11.6	328°/018
9150	731	12.4/-13.6	325°/018

215 08/11/99 1500

alt (ft)	mb	t/td (°C)	w_dir/w_spd (kts)
669	991	24.0/18.10	349°/004
741	989	23.3/18.00	347°/004
883	984	22.8/17.90	347°/004
1099	977	22.2/17.70	348°/005
1388	967	21.4/17.50	349°/005
1824	952	20.1/17.10	351°/005
2264	937	18.9/16.30	356°/006
2638	925	18.4/15.50	356°/006
2710	923	18.3/15.30	356°/006
3163	908	17.8/14.30	352°/006
3622	893	17.1/13.00	351°/006
4088	878	16.5/11.30	349°/007
4560	864	15.9/9.300	344°/008
5007	850	15.5/7.000	339°/010
5039	849	15.5/6.800	339°/010
5528	834	15.0/4.000	336°/011
6020	820	14.7/1.000	336°/011
6522	805	14.4/-1.90	337°/012
7034	790	14.3/-4.70	338°/012
7556	775	14.2/-7.20	339°/013
8084	761	13.8/-9.30	337°/014
8622	746	13.3/-11.1	333°/015
9173	731	12.6/-12.7	327°/017

Figure 1

The left columns depict an actual theodolite reading taken by the onsite meteorologist at the U.S. National Hot Air Balloon Championship, the BFA's largest event, and given to pilots as part of their preflight briefing. Altitude is represented AGL.

The right columns are the forecast (GMT) for the same location during the flight window. Altitudes are represented MSL, with field elevation at 737 ft.

Both readings show how wind speed and/or direction can change to a degree clearly significant to balloonists, with very small changes in altitude..

These changes in direction play a critical role in the pilot's ability to avoid obstacles, particularly in the landing phase of the flight. Balloons rarely land at airports—such is beyond the operational capability of the aircraft. Therefor, a safe landing is largely dependent on the pilot's ability to assess the wind speed and direction at all altitudes, particularly those close to the ground, which the pilot must use for landing approach.

An added challenge to balloonists is the tendency of the wind directions at various altitudes to change slightly during flight, due to normal heating or cooling of the earth's surface, changing weather conditions, etc. Remember, just a one- or two-degree shift often makes the difference between making or missing an appropriate landing site. And such shifts can take place in very small altitudinal increments (sometimes 50 feet or less), particularly at lower altitudes.

A recent study undertaken by meteoroligist Dr. Richard Clark, a professor at Millersville University, provides irrefutable proof that the majority of changes in wind direction occur with decreasing altitude. Most of these directional variations are found at altitudes below 1,000 feet, the majority below 500 feet.

Enabling pilots to assess and use everything at their disposal, especially the forces of nature which govern their direction of flight, enables those pilots to best ensure the safety of persons or property on the surface.

Relief from altitude restrictions would enhance safety by enabling the pilot to plan and execute controlled, stabilized approaches at low altitude, utilizing time spent at lower altitudes to reasonably assess and respond to changes in speed and direction resulting from boundary-layer meteorological effects.

For example, the slight change in direction of surface air currents resulting from a body of water, plowed field, or mass of trees can be used to execute a precise approach to an appropriate landing site, if the pilot is able to utilize this slight change to "steer" to that landing site. These changes in direction or speed often occur only very close to the surface.

While the AIM reports adverse affects of microbursts on aircraft flying at low altitudes, and while microbursts as such are not easily detectable, the conditions which must be present in order to produce a microburst are clear. The study states that "...microbursts commonly occur within the heavy rain portion of thunderstorms, and in much weaker, benign appearing convective cells..."

Balloons are ***never*** intentionally flown in conditions favoring thunderstorms or microbursts. One of the first things a student balloon pilot learns in training is ***never*** to launch within 50 miles (or more, in some cases) of any convective activity, and always to ask for reports of such activity in the preflight weather briefing. In addition, the balloon pilot is always on the alert for convective activity forming during flight.

Freedom to fly at lower altitudes would enhance the safety to persons and property on the ground, to the pilot, and to passengers.

APPENDIX C

Summary of Available Data Concerning Altitude Restrictions and Their Effect on Balloon Operations As Reported by the Aviation Safety Reporting System in *ASRS Directline,* Issue Number 9

The overwhelming majority of ballooning mishaps occur during the landing phase. Equipment failure in this type of aircraft is rare, and multiple redundancies in system design usually enable the pilot to deal with any emergency in a safe and efficient manner.

A study of reports submitted to the Aviation Safety Reporting System, or ASRS, reveals that, quite frequently, pilots submit these reports as a result of having violated the provisions of FAR 91.119. In fact, the largest number of these reports, 20% or more, specifically deal with low-altitude flight. Many of the other reporting reasons, such as landing in a residential area, power line contact, hard landings, and airspace violations, can reasonably be assumed to have been avoidable had the pilots been free to use wind at lower altitudes to "steer" their aircraft in a safer direction. A recent study undertaken by meteoroligist Dr. Richard Clark, a professor at Millersville University, provides irrefutable proof that the majority of changes in wind direction occur with decreasing altitude. Most of these directional variations are found at altitudes below 1,000 feet, the majority below 500 feet.

Below is a table showing the percentages for each category of reported incidents received by the ASRS. Multiple citations are possible within the same report, thus the combined total of percentages shown is greater than 100%.

Low-Altitude flight	20%
Power line contact	16%
Landing in residential areas	16%
High wind/hard landing	11%
Airspace violations	10%
Miscellaneous	10%
Ground incidents	9%
Mid-air collisions	8%
Ground personnel perceptions	7%
VFR in IMC	7%
Balloon in airplanes' airspace	6%
Livestock incidents	4%
Propane leak/fuel contamination	4%

When faced with changing weather situations, either increasing or decreasing wind, approaching inclement weather or darkness, it becomes ever more important for pilots to be able to use every reasonable means available to maneuver their craft to the safest possible landing.

Fully 60% of the above mentioned reports involved weather-related causes. Of these, 66% listed unforecast increasing winds as the problem. Others cited thermals, becoming becalmed, or VFR into IMC due to fog or fast-forming clouds underneath the balloons in flight.

In all of these scenarios, lower altitude provides the maximum degree of safety in balloon operation.

In a high wind scenario, a pilot is free to drop quickly into an available landing site, using all of its length for the horizontal drag that usually results in high winds. If the pilot is forced to make a landing approach from 1000 feet, the faster ground winds blow him off course before he can safely land. The solution is a high-vertical-speed descent, which is far more likely to cause injury and damage to passengers and property on the surface than a horizontal drag of any distance.

In the case of low or no wind, usually occurring just before sunset, the pilot of a balloon at low altitude is more able to drop a ground handling line to waiting crew to assist him into a suitable landing site. Before reaching that necessity, he would have been able to make use of lower-level winds to "steer" his balloon to a suitable location.

If a balloon pilot encounters thermals, the safe course of action is to climb out of the thermal, fly at altitude to a thermal-free area, then descend to a safe landing. Having reached a good landing site, however, the pilot must again use various wind directions at lower altitudes (in the boundary layers of wind just above the surface) to maneuver to a safe terminus.

Perhaps most important in the desirability of low altitude flight is the formation of fog or low clouds underneath the balloon. With the relatively low speed at which balloons fly, and the total visibility below that a pilot enjoys while standing in an open basket, the pilot can usually see the signs of low cloud of fog beginning to form. At this point, the safest thing for the pilot to do is to descend to just above the treetops, and utilize the first available landing site. From 1000 or even 500 feet, it's nearly impossible to see obstacles such as buildings or power lines.

In the NTSB's accident and incident database, one can easily separate incidents taking place within the structure of a balloon event or in general operating circumstances. The majority of such events operate under the standard waiver referred to above. The percentage of accidents occurring under this waiver is slightly lower than those occurring in non-waivered flight. While the difference is too small to point convincingly to waivered flight (and its accompanying relief from altitude restriction) being safer than non-waivered flight, it certainly is a clear indication that lower altitude does not, by itself, cause an increase in accidents or incidents.